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EXAMINER

LAVARIAS, ARNEL C

ART UNIT	PAPER NUMBER
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2872

DATE MAILED: 03/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/869,351

Applicant(s)

LACOUR ET AL.

Examiner

Arnel C. Lavarias

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/16/03 has been entered.

Response to Arguments

2. The Applicants argue that it is improper to combine the teachings of Singh et al., Koester et al., and Elings et al. since the three teachings do not come from analogous arts. The Examiner respectfully disagrees. It is noted that all three teachings come from fields related to optical spectroscopy, and in particular optical emission spectroscopy. One skilled in the art would have known that the fields of endeavor of each of the three teachings, i.e. laser-induced breakdown spectroscopy, laser-induced fluorescence, and laser photo-coagulation, are all related, especially given that the optical system of each are very similar.
3. The Applicants argue that, with respect to Claim 1, the combined teachings of Singh et al., Koester et al., and Elings et al. fail to teach or reasonably suggest the elementary analysis device including means for displacing the object within a plane after each pulse

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of the laser source. The Examiner respectfully disagrees. Singh et al. specifically discloses that the plane on which the sample is on may be rotated during the recording of a measurement (See col. 8, lines 19-43). Since the source is disclosed to be a pulsed laser (See 1 in Figure 1; col. 5, lines 12-51), the sample will be rotating in the plane during and after each pulse of the source. Similarly, Elings et al. discloses that the sample may be translated within a plane during illumination of the laser (See 62, 70 in Figure 4). Elings also discloses the laser source as an argon ion laser, which is known in the art to be pulsed and CW. The continuous movement of the sample in the plane will occur during and after each pulse if the laser is pulsed, or while the laser is on if it is CW.

4. Applicants' other remarks (See in particular Pages 7-8 in Applicants' submission dated 12/16/03) are noted, but are moot in view of the new ground(s) of rejections.
5. Claims 1-18 are rejected as follows.

Claim Objections

6. Claims 1-18 are objected to because of the following informalities:

Claim 1, line 5- 'sourceon' should read 'source on'

Claim 1 recites the limitation "the required dimension" in lines 11-12. There is insufficient antecedent basis for this limitation in the claim.

Claim 1, line 17-18- 'this spectrum analysis' should read 'the means for analyzing'

Claims 3 and 11 recite the limitation "the impact size" in line 1 of each claim. There is insufficient antecedent basis for this limitation in the claim.

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Claims 4 and 12 recite the limitation "the displacement frequency" in line 1 of each claim. There is insufficient antecedent basis for this limitation in the claim.

Claim 6 recites the limitation "the relative variation of energy" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

Double Patenting

7. A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

8. Claim 13 is objected to under 37 CFR 1.75 as being a substantial duplicate of Claim 5.

When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

9. Claim 14 is objected to under 37 CFR 1.75 as being a substantial duplicate of Claim 6.

When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after

allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

10. Claim 17 is objected to under 37 CFR 1.75 as being a substantial duplicate of Claim 10. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 1, 7, 18, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Carlhoff et al. (U.S. Patent No. 5537207) in view of Koester et al. (U.S. Patent No. 3783874), of record, and Singh et al. (U.S. Patent No. 5751416), of record.

Carlhoff et al. discloses an elementary analysis device by optical emission spectrometry on laser produced plasma (See Figure 4), the device comprising a pulsed laser source (See 5 in Figure 4); a diaphragm having an aperture (See 16 in Figure 4) for selecting part of a laser beam emitted by the pulsed laser source on an object to be analyzed (See 1, 1a in Figure 4); second optical means, such as an objective, receiving

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the image of the diaphragm and focusing it on the object to be analyzed to produce plasma on the surface of the object (See 19 in Figure 4), wherein the image of the diaphragm focused on the object is equal to the required dimension on the object, and the focal point of the laser beam, after crossing through the diaphragm and the second optical means, is outside the image plane of the diaphragm (See col. 7, line 60-col. 8, lines 7); means for analyzing a light radiation spectrum emitted by the plasma, the means for analyzing disposed adjacent to the plasma (See 10, 28 in Figure 4); and means for determining the elementary composition of the object from the means for analyzing (See 30, 29, 13 in Figure 4; col. 8, lines 25-45). Carlhoff et al. lacks a first optical means projecting the image of the diaphragm to infinity; the aperture of the diaphragm having a fixed diameter with the laser beam not being focused in the plane of the diaphragm; and means for displacing the object within a plane after each pulse of the laser source.

However, Koester et al. teaches a method and apparatus for effecting photo-coagulation (See for example Figure 1), the method and apparatus including a diaphragm (See 28 in Figure 1) usable for selecting part of the laser beam emitted by the source, and delimiting the shape of the impact of the laser beam on an object to be analyzed, the laser beam not being focused in the plane of the diaphragm (See Figure 1). Additionally, Koester et al. teaches a first optical means (See 106 in Figure 1) that utilizes an afocal telescope comprising refractive lenses for projecting the image of the diaphragm to infinity. It is noted that Figure 1 suggests that the diaphragm and the afocal telescope may be used together since each of the diaphragm and the afocal telescope perform different functions within the apparatus of Koester et al. (See in particular col. 3, line 63-col. 4, line 26).

Further, it is extremely well known in the art of optical spectroscopy to utilize an aperture/diaphragm/pinhole that has either a fixed or variable diameter opening in the beam path (thus altering the shape and size of the beam cross-section passing through the aperture/diaphragm/pinhole). One skilled in the art would understand that the diameter of the aperture/diaphragm/pinhole may be kept constant, or dynamically altered, depending on the requirements of the beam shape of the input laser. Once a desired beam shape is achieved, the diameter of the aperture/diaphragm/pinhole is kept constant until a condition arises where the beam shape, and hence the diameter of the aperture/diaphragm/pinhole must change. The combined teachings of Carlhoff et al. in view of Koester et al. do not suggest means for displacing the object within a plane after each pulse of the laser source. However, Singh et al. discloses an elementary analysis device by optical emission spectrometry on laser-produced plasma (See Figure 1), comprising a pulsed laser source (See 1 in Figure 1), a second optical means (See 5 in Figure 1) and an object to be analyzed (See 6 in Figure 1). Singh et al. also discloses a means disposed adjacent to the plasma (See 11 in Figure 1; see Intensified Diode Array Detector and Spectrograph) for analyzing a light radiation spectrum emitted by the plasma, and a means (See 11 in Figure 1; Computer) of determining the elementary composition of the object based from this spectral analysis (See col. 7, lines 17-27), and that the plane on which the sample is on may be rotated during the recording of a measurement (See col. 8, lines 19-43). Since the source is disclosed to be a pulsed laser (See 1 in Figure 1; col. 5, lines 12-51), the sample will be rotating in the plane during and after each pulse of the source. Therefore, it would have been obvious to one having

ordinary skill in the art at the time the invention was made to have the elementary analysis device of Carlhoff et al. further include a first optical means projecting the image of the diaphragm to infinity; the aperture of the diaphragm having a fixed diameter with the laser beam not being focused in the plane of the diaphragm; and means for displacing the object within a plane after each pulse of the laser source, as taught by Koester et al. and Singh et al. One would have been motivated to have the elementary device include a first optical means projecting the image of the diaphragm to infinity, such as by the incorporation of an afocal telescope, to allow further magnification, reduction, or relaying of the light beam. One would have been motivated to have the aperture of the diaphragm have a fixed diameter with the laser beam not being focused in the plane of the diaphragm to restrict stray light from entering the optical system, while allowing for adjustment of the energy/intensity distribution of the laser. Finally, one would have been motivated to include means for displacing the object within a plane after each pulse of the laser source to allow analysis of different locations on the surface of the sample (i.e. position-dependent analysis).

13. Claim 2, as best understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Carlhoff et al. in view of Koester et al. and Singh et al. as applied to Claim 1 above, and further in view of Lehureau (U.S. Patent No. 5657304), of record.

Carlhoff et al. in view of Koester et al. and Singh et al. discloses the invention as set forth above in Claim 1, except for the second optical means having a numerical aperture equal to approximately 0.1 or greater. However, Lehureau teaches a numerical aperture greater than 0.1 (See col. 1, lines 47-50). Therefore, it would have been obvious to one

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having ordinary skill in the art at the time the invention was made to modify the second optical means of Carlhoff et al. in view of Koester et al. and Singh et al. to include a numerical aperture, as taught by Lehureau, to reduce mechanical failures and provide a very small spot size for the input light beam.

14. Claims 3, 5, and 13, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Carlhoff et al. in view of Koester et al. and Singh et al. as applied to Claim 1 above, and further in view of Sabsabi et al. (U.S. Patent No. 6008897 or Sabsabi '897), of record.

Regarding Claim 3, Carlhoff et al. in view of Koester et al. and Singh et al. discloses the invention as set forth above in Claim 1, except for the impact size of the laser beam on the object being greater than or equal to 1 μm . However, Sabsabi '897 teaches the impact size of the laser beam on the object being greater than 1 μm (See col. 7, lines 5-6). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the impact size of the laser beam of Carlhoff et al. in view of Koester et al. and Singh et al. to be greater than 1 μm , as taught by Sabsabi '897, to obtain the correct energy densities in the beam to form a plasma.

Regarding Claims 5 and 13, Carlhoff et al. in view of Koester et al. and Singh et al. discloses the invention as set forth above in Claim 1, except for the pulsed laser source emitting ultraviolet light. However, Sabsabi '897 teaches the source emitting ultraviolet light (See col. 7, lines 10-11). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the pulsed laser source of Carlhoff et al. in view of Koester et al. and Singh et al. to produce ultraviolet

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light, as taught by Sabsabi '897, to effectively penetrate for a longer period the developing plasma and reach the target surface for maximum laser ablation (See col. 6, lines 51-61).

15. Claim 4, as best understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Carlhoff et al. in view of Koester et al. and Singh et al. as applied to Claim 1 above, and further in view of Sabsabi et al. (U.S. Patent No. 5781289 or Sabsabi '289), of record.

Carlhoff et al. in view of Koester et al. and Singh et al. discloses the invention as set forth above in Claim 1, except for the displacement frequency of the object between two laser pulses of the source is greater than or equal to 15 Hz. However, Sabsabi '289 teaches the displacement frequency of the object between two laser pulses of the source being greater than 15 Hz (See col. 7, lines 46-63). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the displacement frequency of the object as disclosed by Carlhoff et al. in view of Koester et al. and Singh et al. to be greater than 15 Hz, as taught by Sabsabi '289, to increase the number of samples that are measured.

16. Claims 6 and 14-15, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Carlhoff et al. in view of Koester et al. and Singh et al. as applied to Claims 1 and 7 above, and further in view of Magee et al. (U.S. Patent No. 4758533), of record.

Carlhoff et al. in view of Koester et al. and Singh et al. discloses the invention as set forth above in Claims 1 and 7, except for the relative variation of energy between laser

pulses not exceeding 5%. However, Magee et al. discloses the relative variation of energy between laser pulses not exceeding 5% (See col. 7, lines 63-65). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the laser of Carlhoff et al. in view of Koester et al. and Singh et al. to have the relative variation of energy between laser pulses not exceed 5%, as taught by Magee et al., to have a more consistent quality of analysis.

17. Claim 8, as best understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Carlhoff et al. in view of Koester et al. and Singh et al. as applied to Claims 1 and 7 above, and further in view of Ferguson et al. (U.S. Patent No. 5780806), of record.

Carlhoff et al. in view of Koester et al. and Singh et al. discloses the invention as set forth above in Claims 1 and 7, except for the first and second optical means being anti-reflection treated for reflections at the wavelength of the light emitted by the pulsed laser source. However, Ferguson et al. teaches making lenses with anti-reflection coatings, particularly for applications requiring high pulsed laser power density (See col. 6, line 38-col. 7, line 4). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to make the first and second optical means of Carlhoff et al. in view of Koester et al. and Singh et al. anti-reflective at the wavelength of the laser, as taught by Ferguson et al., to minimize reflection and to maximize the laser's throughput.

18. Claim 9, as best understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Carlhoff et al. in view of Koester et al. and Singh et al. as applied to Claim 1 above, and further in view of Andre et al. (U.S. Patent No. 5583634), of record.

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Carlhoff et al. in view of Koester et al. and Singh et al. discloses the invention as set forth above in Claim 1, except for a means for blowing a gas jet onto the object.

However, Andre et al. teaches a means for blowing a gas jet onto the object (See col. 2, lines 55-67). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the elementary analysis device of

Carlhoff et al. in view of Koester et al. and Singh et al. to include a means for blowing a gas jet onto the object, as taught by Andre et al., to create more favorable conditions for spectral analysis (See col. 2, lines 60-62).

19. Claims 10 and 17, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Carlhoff et al. in view of Koester et al. and Singh et al. as applied to Claim 1 above, and further in view of Svanberg et al. (U.S. Patent No. 4786813), of record.

Carlhoff et al. in view of Koester et al. and Singh et al. discloses the invention as set forth above. Additionally, Carlhoff et al. in view of Koester et al. and Singh et al. discloses a mirror (See 4 of Figure 1 in Singh et al.) reflecting at the wavelength of the laser source and transparent at other wavelengths (See col. 6, lines 42-47 in Singh et al.), and the mirror being placed on the light path between the first and second optical means and designed to reflect almost the entire laser beam to the second optical means and to transmit an image of the object to the observation means (See 10 in Figure 1 of Singh et al.). Carlhoff et al. in view of Koester et al. and Singh et al. lacks a means for observing the object, so that the object can be placed in the image plane of the diaphragm.

However, Svanberg et al. teaches a means for observing the object (See Figure 1; col. 2,

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lines 57-68) in the image plane (See 4 in Figure 1). In the combination of Carlhoff et al. in view of Koester et al. and Singh et al., and further in view of Svanberg et al., the image plane of the diaphragm would be in the object image plane (See 4 in Figure 1).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Carlhoff et al. in view of Koester et al. and Singh et al. to include a means for observing the object, as taught by Svanberg et al., to ensure correct placement of the object for analysis.

20. Claim 11, as best understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Carlhoff et al. in view of Koester et al. and Singh et al., and further in view of Lehureau, as applied to Claims 1-2 above, and further in view of Sabsabi '897.

Carlhoff et al. in view of Koester et al. and Singh et al., and further in view of Lehureau disclose the invention as set forth above in Claims 1-2, except for the impact size of the laser beam on the object is greater than or equal to 1 μm . However, Sabsabi '897 teaches the impact size of the laser beam on the object being greater than 1 μm (See col. 7, lines 5-6). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the impact size of the laser beam of Carlhoff et al. in view of Koester et al. and Singh et al., and further in view of Lehureau, to be greater than 1 μm , as taught by Sabsabi '897, to obtain the correct energy densities in the beam to form a plasma.

21. Claim 12, as best understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Carlhoff et al. in view of Koester et al. and Singh et al., and further in view of Sabsabi '897, as applied to Claims 1 and 3 above, and further in view of Sabsabi '289.

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Carlhoff et al. in view of Koester et al. and Singh et al., and further in view of Sabsabi '897, disclose the invention as set forth above in Claims 1 and 3, except for the displacement frequency of the object between two laser pulses of the source is greater than or equal to 15 Hz. However, Sabsabi '289 teaches the displacement frequency of the object between two laser pulses of the source being greater than 15 Hz (See col. 7, lines 46-63). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the displacement frequency of the object as disclosed by Carlhoff et al. in view of Koester et al. and Singh et al., and further in view of Sabsabi '897, to be greater than 15 Hz, as taught by Sabsabi '289, to increase the number of samples that are measured.

22. Claim 16, as best understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Carlhoff et al. in view of Koester et al. and Singh et al., and further in view of Ferguson et al., as applied to Claims 1, 7-8 above, and further in view of Andre et al.

Carlhoff et al. in view of Koester et al. and Singh et al., and further in view of Ferguson et al., discloses the invention as set forth above in Claims 1, 7-8, except for a means for blowing a gas jet onto the object. However, Andre et al. teaches a means for blowing a gas jet onto the object (See col. 2, lines 55-67). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the elementary analysis device of Carlhoff et al. in view of Koester et al. and Singh et al., and further in view of Ferguson et al., to include a means for blowing a gas jet onto the object, as taught by Andre et al., to create more favorable conditions for spectral analysis (See col. 2, lines 60-62).


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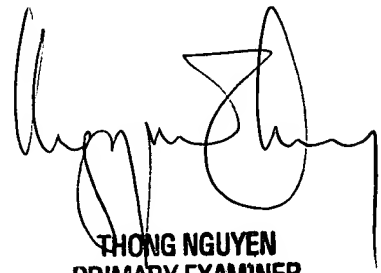
Conclusion

23. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arnel C. Lavarias whose telephone number is 571-272-2315. The examiner can normally be reached on M-F 8:30 AM - 5 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Arnel C. Lavarias
2/12/04


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